

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2005/002578

A. CLASSIFICATION OF SUBJECT MATTER  
Int.Cl.<sup>7</sup> F04B49/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
Int.Cl.<sup>7</sup> F04B49/06Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2005  
Kokai Jitsuyo Shinan Koho 1971-2005 Toroku Jitsuyo Shinan Koho 1994-2005

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|-----------|--|-----------------------|
| X<br>Y    | JP 8-302755 A (Hitachi Construction Machinery Co., Ltd.),<br>19 November, 1996 (19.11.96),<br>Full text; Figs. 1 to 34<br>& US 6101456 A | 2<br>1, 3-14          |
| Y         | JP 11-311203 A (Yutani Heavy Industries, Ltd.),<br>09 October, 1999 (09.11.99),<br>Full text; Figs. 1 to 5<br>(Family: none)             | 1, 3-14               |
| Y         | JP 6-307409 A (Amada Co., Ltd.),<br>01 November, 1994 (01.11.94),<br>Full text; Figs. 1 to 6<br>(Family: none)                           | 1, 3-14               |

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

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"&amp;" document member of the same patent family

Date of the actual completion of the international search  
08 March, 2005 (08.03.05)Date of mailing of the international search report  
22 March, 2005 (22.03.05)Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| Y         | JP 4-220701 A (Tokimec Inc.),<br>11 August, 1992 (11.08.92),<br>Full text; Figs. 1 to 12<br>(Family: none)                          | 1, 3-14               |
| Y         | JP 11-303760 A (Yuken Kogyo Kabushiki Kaisha),<br>02 November, 1999 (02.11.99),<br>Par. No. [0014]; Fig. 1<br>(Family: none)        | 10-11                 |
| A         | JP 3-149602 A (Mannesmann Rexroth GmbH),<br>26 June, 1991 (26.06.91),<br>Full text; Figs. 1 to 15<br>& US 5179330 A & DE 3931962 A1 | 1, 3-14               |